

REMARKS

Claims 1-7 and 10-11 have been rejected under Section 103(a) as obvious over the combination of Reinalda et al. in view of Khare et al. and Wolff-Doring et al. The first two references are said to teach a process for the preparation of zirconia-based catalysts and the third reference is said to teach the value of monoclinic zirconium having a large surface area in zirconia-based catalysts. In view of the amendment made to claim 1 and the following remarks, the Examiner's rejections are respectfully traversed.

Claim 1 has been amended to specify that the zirconia extrudate comprises both zirconium and one or more other elements as defined in the amended claim. The basis for this amendment is found on page 6, lines 1-15, of the specification. The Applicants wish to point out that independent claims 2 and 10 as originally filed describe a process for producing cobalt/zirconia extrudates and cobalt-impregnated zirconia extrudates, respectively.

Examples 8 through 11 on page 25-29 of the specification relate to cobalt/zirconia extrudates. Examples 8 and 9 describe the preparation of such extrudates which have a high radial crush strength. Example 11 compares the catalyst of Example 8 with two comparative catalysts in regard to their ability to prepare hydrocarbons by reaction of a mixture of hydrogen and carbon monoxide. It can be seen that the catalyst of the invention (Example 8) gives significantly improved olefin yields compared to cobalt catalysts based on other types of supports and prepared using different methods.

Reinalda et al. relates to a process for the preparation of a zirconia-based catalyst or catalyst precursor which is prepared by a process comprising mulling a mixture of zirconia and/or a zirconia precursor and a solvent, wherein the mixture has a solid content of from 20 to 60 percent by weight, and extruding the mixture. The zirconia extrudates formed may optionally be impregnated with a catalytically active element. However, this reference does not disclose whether or not the zirconia used is in the monoclinic form. In fact, this reference makes no mention at all of the type of crystal structure of the zirconia particles used in the preparation of the zirconia extrudates. Furthermore, nowhere within this references does it hint or suggest the advantages of using particulate zirconia comprising no more than 15 percent by weight of zirconia which is other than monoclinic zirconia for the preparation of zirconia extrudates, in particular in terms of increasing crush strength.

Khare et al. relates to the preparation of shaped zirconia particles comprising the steps of (a) mixing zirconia powder with an aqueous colloidal solution of zirconia or, alternatively, an aqueous acid solution, and adjusting the water content of the obtained mixture to a level of about 5 to about 40 percent by weight water; (b) shaping the mixture obtained in (a); and (c) heating the shaped particles obtained in step (b) at a temperature in excess of about 90°C. However, there is no disclosure in this reference of calcined zirconia extrudates comprising zirconia and one or

more other elements selected from groups IB, IIB, IIIB, IVB, VB, VIB, VIIB, VIII of the Period Table of Elements, lanthanides, and actinides.

Wolff-Doring et al. relates to the preparation of zirconium dioxide which is at least 80 percent by weight in the monoclinic form and has a BET surface area of at least 100 m²/g. This reference also discloses the preparation of molded articles in general using the zirconium dioxide prepared therein. However, there is no disclosure or hint in this reference of the value of using particulate zirconia containing a high level of monoclinic zirconia in terms of preparing zirconia extrudates having high crush strength.

One of ordinary skill in the art would have had no incentive to use the monoclinic zirconia of Wolff-Doring et al. in the processes of Reinalda et al. or Khare et al. As mentioned above, nowhere in Reinalda et al. or Khare et al. does it hint or suggest that the use of monoclinic zirconia would have any effect on the crush strength of the calcined zirconia extrudates prepared therein. In fact, nowhere within Reinalda et al. is it even mentioned that the crystal structure of the zirconia particles would have any effect on the properties of the calcined zirconia extrudates prepared by the process described therein. In addition, nowhere in Wolff-Doring et al. does it hint or suggest that the use of monoclinic zirconia would have any effect on the crush strength of calcined zirconia extrudes. Therefore, one of ordinary skill in the art would have had no incentive to use the monoclinic zirconia prepared in Wolff-Doring in the process disclosed in Reinalda et al. or the process described in Khare et al.

As discussed above, the Applicants have shown in the Examples that the combination of monoclinic zirconia with the process steps described in claims 1, 2, and 10 provide a significant advantage. The data in Table 3 shows that significantly improved olefin yields are obtained using the catalyst of the invention as opposed to the comparative catalysts. The Applicants assert that these unexpected results overcome the obviousness rejections set forth by the Examiner.

In light of the amendments to claim 1 and the arguments set forth above, the Examiner is respectfully requested to reexamine the opinion on patentability of the present invention. An early notice of allowance is respectfully requested.

Respectfully submitted,

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